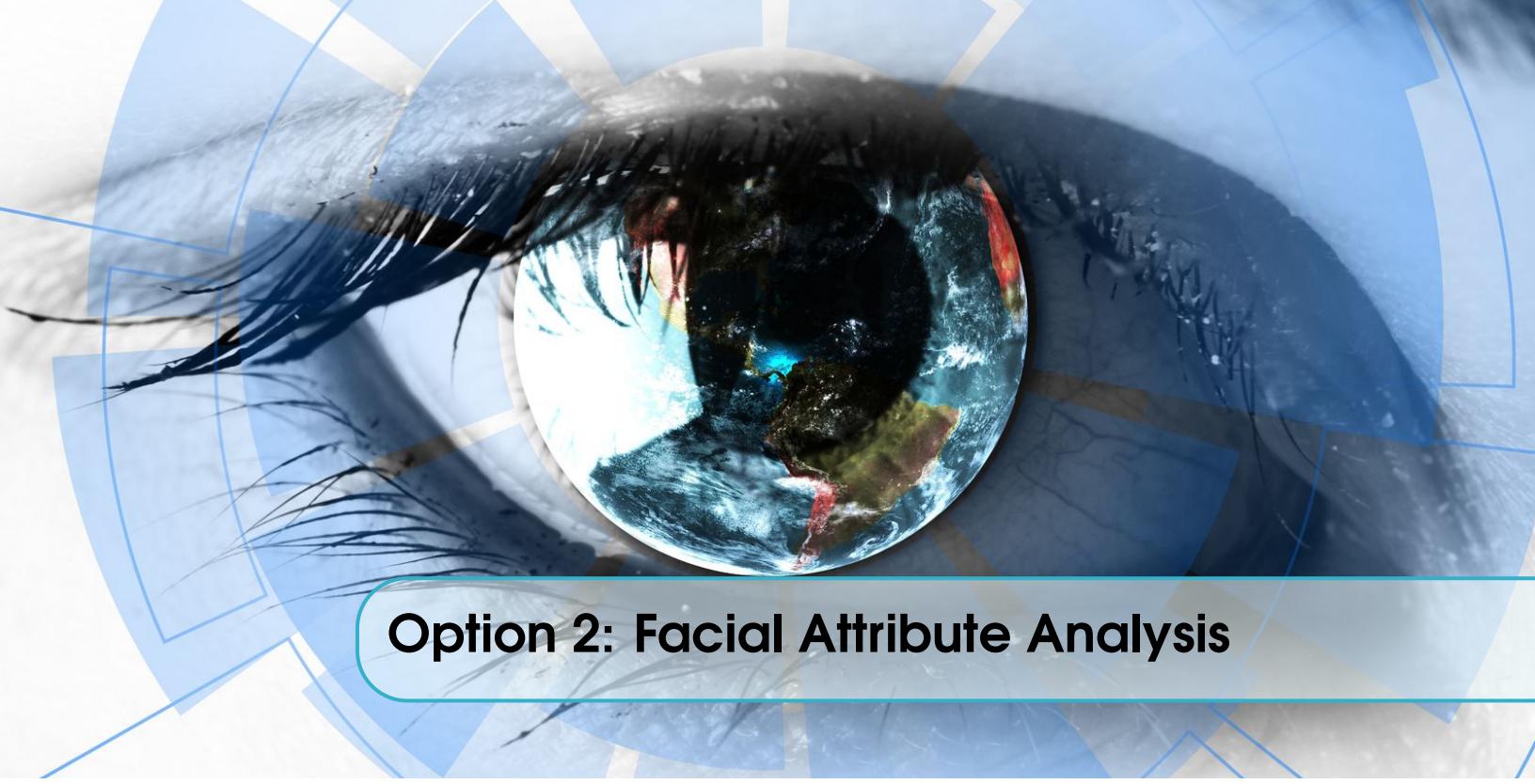


# **COMP3419**

## **Graphics and Multimedia**

### **Assignment-2 Option-2**



## Option 2: Facial Attribute Analysis

### 1 Key Information

- The mark of "**COMP3419 Assignment-2 Multimedia Project (Option-2: Facial Attribute Analysis)**" will be given on canvas submission. Due time: before 23:59, Sunday of Week 12 (2020-11-22).
- This individual assignment is worth **16%** of your final assessment.
- **CelebFaces Attributes Dataset (CelebA)** can be downloaded from [here](#).
- **Submission Deliverables:** Students are asked to create a **zip** file of all deliverables, including a project report (written in **LATEX**), all source code (with your best model saved), and a demo video. Please be aware of the following submission **restrictions** that (1) this zip file should be named as "SIDxxxxxx\_Asgmt2Opt2.zip" where xxxxxx denotes the student ID (e.g., "SID450003419\_Asgmt2Opt2"), and (2) the demo video should be named as "SIDxxxxxx\_Asgmt2Opt2.mp4" as well. Failing to follow these restrictions or missing of demo video would cause a 5-mark penalty immediately.
- Students' assignments **will only be marked** if all deliverables can be **accessed** from the Canvas System, and they can be **runnable** following instructions provided in README txt file. Once plagiarism detected by the Canvas system, the student will receive no mark immediately, as well as other related penalties from university.
- A **README** txt file (to describe the steps/instructions regarding how to get the source code running to derive the expected outputs) would help markers get familiar with the submission.

### 2 General Marking Policy

#### Late Submission Policy

For the late submission cases, penalties will be assigned according to the university wide late penalties for assignment Clause 7A of the Assessment Procedures.

#### Special Consideration and Arrangements

While you are studying, there may be circumstances or essential commitments that impact your academic performance. Our special consideration and special arrangements process is there to

support you in these situations. More information on how to lodge the special consideration application, can be found from this [webpage](#).

### 3 Introduction

The aim of this individual assignment (Assignment-2 Option-2) is to develop ideas and evaluate methods in the domain of pattern recognition, especially for facial attribute recognition. Here we introduce a large-scale public dataset - CelebFaces Attributes Dataset (**CelebA**).

### 4 Dataset Description

- The dataset used in this assignment is [CelebA](#) (please download the dataset **img\_align\_celeba.zip** from the **CelebA** directory), containing 202,599 number of face images cropped from online celebrity images.
- Totally, 40 facial attributes (i.e. Bald, Bangs, Arched\_Eyebrows, Attractive, etc.) are labeled and annotated for each face image. The main objective is a multi-label classification task to classify all the facial attributes involved in one face. Ground truth labels are included in **Ann/list\_attr\_celeba.txt** where "1" and "-1" denote positive and negative, respectively.
- A txt file **Eval/list\_eval\_partition.txt** needs to be downloaded, which includes the official train/val/test dataset splitting. The first column indicates the file name, and the second column indicates the splitting type (train-0, val-1, test-2).
- The model performance should be evaluated as **averaged accuracy** on the **test** dataset.

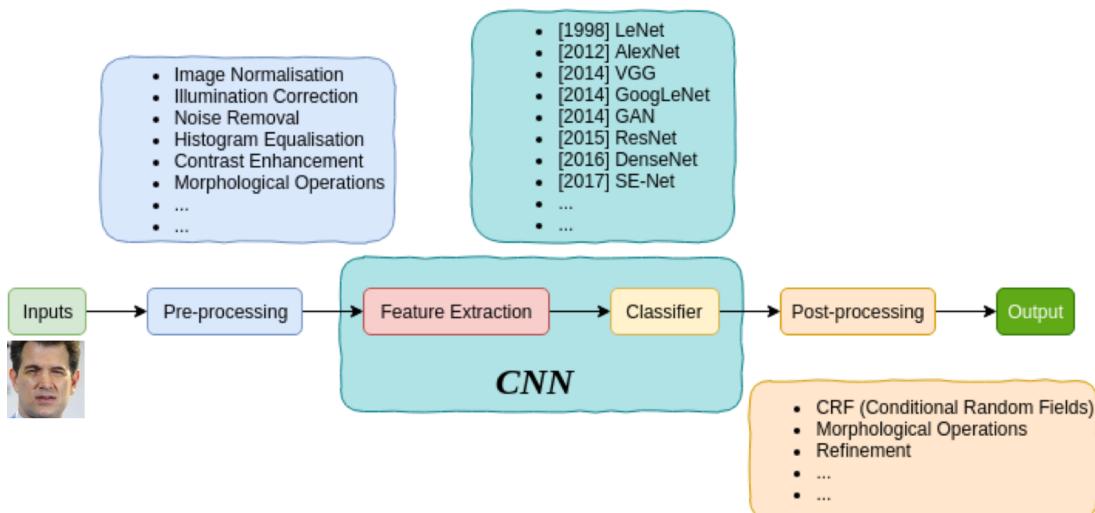


Figure 1: Training pipelines for deep learning architectures.



Hint: To further improve the model performance, some keywords are provided for your own interest: attention network, transformer, generative adversarial network, transfer learning, domain adaptation.

## 5 Method Design (8%)

- 4% Students are requested to develop an learning-based automatic framework for this facial attribute analysis task. Its pipeline might include but not limited to data augmentation, machine learning, deep learning, or a combination of these various types of methods. You can use any open-source libraries, such as Pytorch, scikit-learn, Keras and Tensorflow.
- 2% Students are also requested to fine-tune their method, complete performance comparison (following the official dataset split), and discuss the significance of their proposed approach.
- 2% Some ablation studies should be performed to verify the performance gain caused by each individual component proposed in your approach and/or other attempts made, such as data augmentation techniques adopted, data preprocessing steps implemented and etc.



You can get some ideas about method design from the research papers uploaded on Canvas (Reference\_Papers.zip). These papers are well-selected to present a variety of method designs and levels of complexity.

## 6 Project Report (8%)

The report should contain introduction, methods, experimental setup, results & discussion, conclusion, and references. It should be 2 – 4 pages (maximum 6) in two-column layout, using this template (<http://www.latextemplates.com/template/wenneker-article>) to follow the scientific style and formatted with  $\text{\LaTeX}$ <sup>1</sup>. A brief guideline of the report sections is as follows:

- 1% Introduction: introducing the project aim, methods and findings (suggested in 200 - 300 words; no more than 500 words).
- 2% Methods: presenting the details of your method developed, including brief description of method theories and details in design choices.
- 1% Experimental setup: describing the dataset and evaluation metrics (suggested in 100 - 200 words; no more than 250 words).
- 2% Results & Discussion: presenting the evaluation results of each method, including evaluation of main design choices, and if applicable presenting results from combining various methods. Based on the experiment results, insightful discussion is expected to demonstrate the corresponding analysis performed. Tables and figures are preferred to be used for result demonstrations.
- 1% Conclusion: summarising the study and findings (suggested in 100 - 120 words; no more than 150 words).
- 1% References: listing literature and other references (papers and/or online resources).

## 7 Deliverables

Students are requested to create a zip file of all deliverables, including

- All the related source code (with your best model saved).
- A PDF project report formatted with  $\text{\LaTeX}$ .
- A demo video (recorded in Zoom) to introduce your method and findings.
- See *Key Information* section for submission restrictions.

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<sup>1</sup>Do not worry if you have not used latex before. It has a similar syntax to HTML. You can find a handy online latex editor at <https://www.sharelatex.com/>.



**Demo Video:** The presentation of your method designs, findings, as well as your final results, should be recorded as a video, using **Zoom** for its screen-sharing function, and the expected duration is 3-5 mins (no more than 5 mins). It is suggested to use Microsoft PowerPoint/Google Slides along with the experiment results to present your model performance, following the same structure of the project report.



**Bonus Marks:** Different bonus marks will be distributed based on the ranking of the evaluation metrics, over all submissions made to Canvas:

- top 10% - 4 marks
- top 50% - 2 marks
- top 85% - 1 mark

## 8 Google Cloud Platform Education Grant for COMP3419 Students

You can either work locally or use the remote computing platform Google Cloud Engine (click here), which is funded by Google Cloud Platform Education Grant for COMP3419 students, to gain a better computational resources (CPU, GPU, TPU, etc).

### Student Google Cloud Coupon Retrieval Access

- You will be asked to provide your name and school email address (e.g., [unikey@uni.sydney.edu.au](mailto:unikey@uni.sydney.edu.au)), which needs to match the domain (**please choose @uni.sydney.edu.au from the drop-down menu**, rather than the default @sydney.edu.au one). An email will be sent to you to confirm these details before a coupon is sent to you.
- You can only request **ONE** code per unique email address.
- Here is the URL you will need to access in order to request a Google Cloud Platform coupon, [click here](#) (make sure you choose the correct domain setting).
- Watch the [Google Cloud Platform Essentials](#) video series on YouTube.
- Instructions for [how to redeem grants](#) in Google Cloud Platform and click "**Redeem Now**" button.
- A **comprehensive tutorial** on Google Cloud setup and dependencies setup for deep learning based AI projects can be found from [here](#).
- Please ensure your instances closed everytime when you finish with using or training in Google Cloud, to avoid unexpected waste in your coupon.